

On the 16th and 17th easterly winds of gale force prevailed over the eastern and middle sections of the ocean, and on the former date one vessel reported snow near latitude 45° N., longitude 24° W. On the 17th southerly gales were also reported along the American coast between Hatteras and Nantucket. Storm log:

*British S. S. Exeter City:*

Gale began on the 16th, wind E. Lowest barometer 29.78 inches at midnight on the 16th, wind E., 7, in latitude 44° N., longitude 36° 15' W. End on the 18th, wind E. Highest force of wind 7, E.; steady E.

From the 18th to the 20th unusually quiet weather prevailed over practically the entire ocean. On the 21st there was a disturbance in the region southwest of the Azores, as shown by the following storm log.

*Italian S. S. Federica:*

Gale began on the 21st, wind SSW. Lowest barometer 29.72 inches at 6.40 a. m. on the 21st, wind WSW., 8, in latitude 34° 55' N., longitude 34° 50' W. End at 10 p. m. on the 21st, wind WSW. Highest force of wind 9; steady WSW.

From the 22d to the 24th summer conditions were again the rule, with here and then an isolated vessel that encountered fairly strong winds.

On the 25th the northern European coast was visited by northerly gales that covered a limited area. Storm log:

*American S. S. West Modus:*

Gale began on the 24th, wind NW. Lowest barometer 29.72 inches at 6 p. m. on the 24th, wind NW., 7, in latitude 59° 10' N., longitude 10° 10' W. End on the 25th, wind NNE. Highest force of wind 8, NNE.; shifts W.-NW.-N.-NNE.

On the 26th and 27th St. Johns, Newfoundland, was near the center of an area of low pressure, and while moderate weather prevailed in that vicinity a few vessels encountered gales in the territory between the 40th and 50th parallels and the 30th and 50th meridians, as shown by following storm log:

*Italian S. S. Piave:*

Gale began on the 26th, wind W. Lowest barometer 29.71 inches at 4 p. m. on the 26th, wind W., 9, in latitude 42° 30' N., longitude 43° 54' W. End on the 26th, wind WNW. Highest force of wind 10; shifts not given.

On the 28th the barometric reading was still comparatively low at St. Johns, although by the 29th it had risen considerably. On the 30th the pressure was high over the entire ocean, with the exception of the Gulf of Mexico, and light to moderate winds were reported from that locality. The following storm log was the only one received for the 30th:

*American S. S. West Modus:*

Gale began on the 30th, wind S. Lowest barometer 30.14 inches at 8 a. m. on the 30th, wind S., 6, in latitude 47° 32' N., longitude 38° 13' W. End of gale on the 30th, wind SW. Highest force of wind 8, S.; shifts S.-SW.

On the 31st a deep depression appeared, central near latitude 40° N., longitude 55° W., although judging from reports received, its influence did not extend far. Storm log:

*British S. S. Wells City:*

Gale began on the 30th, wind SE. Lowest barometer 29.14 inches at 4 a. m. on the 31st, wind WSW., 8, in latitude 41° 09' N., longitude 56° 07' W. End on the 31st, wind N. Highest force of wind 8, NW.; shifts SE.-SW.-NW.-N.

## NORTH PACIFIC OCEAN.

By WILLIS E. HURD.

The incoming of summer conditions was well portrayed by the weather of May over the North Pacific Ocean. There was some rough weather over the northern

routes, but the Aleutian Low which, during the cooler months, exercises so major a control over the meteorological events in this region, could be seen as appreciably weakening. Therefore the gales experienced by steamers traversing these waters were less severe. The winter high which continued along the China coast in April practically lost its identity in May, and the north-east monsoon seems in great measure to have given place to the transition weather normal to the season in lower Asiatic waters. Several storms appeared in this region, but most of them were of continental origin and of only moderate intensity. The one disturbance of considerable moment in the Far East was a typhoon, which will be mentioned later.

East of the 180th meridian the North Pacific high practically controlled the weather over a great area after the 9th. Early in the month the weather of the region midway between the United States west coast and Hawaii was unsettled and the pressure moderately low until the 9th; thereafter the high occupied its normal position with a crest of about 30.20 inches during the second decade. After the 20th the high moved westward and intensified, so that its center, with an average pressure of 30.40 inches, lay near latitude 40° N., on the 155th meridian of west longitude.

In the Mexican coast region the weather was considerably affected by the fairly persistent low-pressure area which fluctuated over Mexico and the southwestern portion of the United States, giving frequent fresh northwesterly winds along the coast from San Francisco to Cape San Lucas and even farther southward, especially during the latter half of the month. South of the 15th parallel calms and light variable winds prevailed. Over the Gulf of Tehuantepec northeasterly to northwesterly winds of gale force were reported upon several occasions. On the 9th and 10th these gales reached a force of 9. On the 9th a gale of force 8 from north-northeast occurred in latitude 10° 50' N., longitude 88° 49' W. However, there were no pressure disturbances noted in this region.

At Honolulu pleasant weather was experienced. The prevailing wind was from the east, with maximum velocity, 33 E., occurring on the 24th. The average hourly velocity was 10.6 miles an hour, or 2.3 miles higher than the 19-year average. Sunshine was normal, but the rainfall, 0.36 inch, was 1.38 inches less than the normal, and the month was the third driest since 1905. Dry weather also prevailed on the California coast, San Francisco receiving only 7 per cent of the normal amount for May.

On the 3d and 4th of the month a storm moving eastward from Japan gave rise to moderate gales. On the 3d the American S. S. *President Taft* experienced a southerly gale, force 8, lowest pressure 29.63 inches, in latitude 34° 45' N., longitude 141° E., and on the following day the Japanese S. S. *Toyooka Maru* reported a gale of force 8 from the south-southeast, lowest pressure 29.65 inches, in 39° 40' N., 150° 10' E. No further reports of the storm are available.

On May 5 signs of a tropical disturbance appeared to the southward of the Bonin Islands. On the 6th the disturbance moved northeastward, increasing in energy to a typhoon, and at noon was reported central near latitude 25° N., longitude 140° E. The British oil tanker *Adna*, Hongkong toward San Francisco, came within the influence of the typhoon on the 6th, and remained there until the 8th, but although it experienced rough seas, did not encounter winds of force higher than 7. The vessel, however, received reports of the typhoon's

activities which bespoke for it a considerable intensity. At 6 p. m. of the 6th the storm was reported in latitude  $30^{\circ}$  N., longitude  $144^{\circ}$  E., with an observed pressure of 28.74 inches. At noon of the 7th its position was placed in  $35^{\circ}$  N.,  $147^{\circ}$  E., while the *Adna* was in  $36^{\circ} 44'$  N.,  $142^{\circ} 58'$  E., lowest pressure 29.42 inches. In the rough seas and in the dense fog which prevailed for a portion of the 7th and 8th, with her head to the storm, the *Adna* slowed engines for several hours. On the 8th the typhoon was reported central near  $39^{\circ}$  N.,  $150^{\circ}$  E., moving north-eastward.

On the 7th the British S. S. *Shabonee*, San Francisco toward Nagasaki, encountered fierce winds in this storm in  $32^{\circ} 48'$  N.,  $144^{\circ} 40'$  E., highest force 11, from east by south, lowest pressure 29.04 inches. No information is at hand concerning the whereabouts of the typhoon on the 9th, but on the 10th it seems quite certain that it passed into the Aleutian region. The British S. S. *Empress of Canada*, bound toward Yokohama, at an early hour observed a southeast gale near  $49^{\circ}$  N.,  $168^{\circ}$  E., with falling pressure. At 2 p. m. of the 10th, in  $48^{\circ} 50'$  N.,  $165^{\circ} 56'$  E., the vessel experienced a west-northwest gale, force 8, and the lowest pressure reading for the month, 28.57 inches. To quote:

4 p. m., wind NW. x W., 8. Barometer 28.65. High, confused sea; overcast, squally. 8 p. m., wind NNW., 9. Barometer 29.02. Midnight, wind NNW., 8. Barometer 29.39. High NNW. sea. 10th, storm rapidly diminishing.

Early in May, in connection with the cyclonic conditions prevailing midway along the United States-Hawaiian routes, the Japanese S. S. *Azumasan Maru* on the 5th encountered an east gale of force 9, accompanied by a pressure lowest at 29.17 inches, in  $45^{\circ} 17'$  N.,  $138^{\circ} 50'$  W. This storm, which merged with a disturbance of the Aleutian Low type than prevailing south of Alaska, seems not to have been violent at any point. The Low which engulfed it exhibited scarcely more energy, except that its minimum pressure was lower. On the 9th to 11th moderate gales were reported by several vessels within the area bounded by the 40th and 50th parallels,  $142^{\circ}$ d and  $152^{\circ}$ d meridians of west longitude. The Japanese S. S. *Arizona Maru* observed the lowest pressure, 28.80 inches, late on the 10th in latitude  $50^{\circ} 10'$  N., longitude  $147^{\circ} 40'$  W. On the morning of the 11th, slightly to the eastward, the same vessel noted the highest wind force, 9, from the southwest by south, observed in connection with this phase of the storm.

On the 23d the Aleutian Low intensified somewhat to the southwestward of Alaska, and gales of force 8 were reported near  $50^{\circ}$  N.,  $175^{\circ}$  W., by the British S. S. *Empress of Russia*, lowest pressure 29.58 inches.

On the 28th a storm developed off the Vancouver and northwestern Washington coasts, and caused gales to the southward and eastward. The highest wind velocity noted was observed by the North Head Weather Bureau station—56 miles an hour from the south. This was one of the few ocean storms to enter the North American mainland during May.

Pressure averaged normal or below over the eastern part of the ocean, as shown by observations at the island stations. This was the third month with an absence of pressure above normal but was distinguished from the preceding two by reason of the fact that the principal deficiency in May occurred at Midway Island, whereas

in April it was at Honolulu and in March at Dutch Harbor. At the last-named station the average pressure, based on p. m. observations, was 29.83 inches, or practically normal. The highest pressure, 30.50 inches, occurred on the 2d; the lowest, 28.86, on the 13th. Absolute range, 1.64 inches. At Honolulu the mean p. m. pressure was 30.04, as compared with the normal of 30.05 inches. The highest pressure, 30.18, occurred on the 19th; the lowest, 29.94, on the 14th. At Midway Island the mean p. m. pressure (29 days) was 29.96 inches, or 0.13 inch below normal. The highest pressure, 30.16 inches, occurred on the 30th; the lowest, 29.74, on the 11th.

Fog was of widespread occurrence along the northern steamer routes, and was observed over some portion of the area on nearly every day of the month. It was observed along the American coast from Sitka to Cape San Lucas, and with especial frequency off San Francisco and Lower California.

#### NOTES.

Mr. A. W. Roebuck, third officer of the American oil tanker *E. L. Doheny III*, reported the following:

May 28.—10:30 a. m. Saw two exceptionally large waterspouts about a mile apart and moving from east toward west. Latitude  $11^{\circ} 42'$  N., longitude  $89^{\circ} 10'$  W.

Observer John H. Aspinwall, of the British S. S. *Canadian Transport*, Adelaide toward Vancouver, made the following comment:

May 12.—Picked up northeast trades about latitude  $2^{\circ}$  S., longitude  $172^{\circ} 24'$  W. May 26. Lost them in latitude  $34^{\circ}$  N., longitude  $146^{\circ}$  W.

#### STORMY WEATHER OFF THE LOWER SOUTH AMERICAN COASTS.

By WILLIS E. HURD.

The British tanker *San Patricio*, Capt. A. Hulbert, Observer H. C. Archer, Buenos Aires toward San Francisco via Magellan Strait, encountered five days of stormy weather during May, 1923. The storm began at noon of the 6th with a moderate west-northwest gale near latitude  $53^{\circ} 50'$  S., longitude  $71^{\circ} 30'$  W. During the afternoon the wind increased to a strong gale, and by the 7th had become a whole gale, which continued with frequent violent rain squalls, accompanied by high, dangerous seas, until the 11th. The winds were from some westerly direction throughout. The pressure on the 8th dropped as low as 28.73 inches, in latitude  $52^{\circ} 55'$  S., longitude  $74^{\circ}$  W. At 7 a. m. of the 11th in  $47^{\circ} 04'$  S.,  $79^{\circ} 40'$  W., pressure had risen to 29.74 inches.

In connection with the foregoing, a report of a South Atlantic storm encountered by the British S. S. *Vestris*, Capt. Oscar Penrice, Observer A. G. T. Brown, Buenos Aires toward New York, is interesting. At 8 a. m. of May 12 the *Vestris* was in latitude  $34^{\circ} 53'$  S., longitude  $54^{\circ} 28'$  W. From 4 p. m. of that day until 8 a. m. of the 13th, when in  $30^{\circ} 44'$  S.,  $49^{\circ} 13'$  W., the wind increased until it became a whole gale from the west-southwest, which continued until 4 p. m. of the 13th, after which wind and sea abated. The lowest observed pressure was 29.50 inches, in latitude  $33^{\circ} 42'$  S., longitude  $52^{\circ} 52'$  W., on the 12th.